ZFW AF 1731

SP01-253

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Heather D. Boek, et al.	
Serial No:	10/035,535	Examiner: Hoffman, J.
Filed:	10/26/2001	Group Art Unit: 1731
Title:	Methods and Apparatus For Forming A Chlorine-Doped Optical Waveguide Preform	

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith are three (3) copies of an Appeal Brief (9 pages with 5 page Appendix) in the above-identified application.

Note that only three Issues are contained within the Brief although four issues (reasons for rejection) are called out in the Examiner's final Office action. The Examiner in his final Office action has listed the 102(b) rejection pertaining to claims 32-35 twice. Once, apparently erroneously, under the heading of §103 rejections, and a second time, correctly, under §102 rejections, both times indicating a rejection on anticipation. Therefore, the 102(b) rejection under the heading of §103 rejections has been ignored.

Second, in the listing of claims which accompanies the Brief, claim 30 has been listed as "original". In the listing of claims which accompanied the final rejection, and upon which the Brief is based, claim 30 was erroneously listed as "currently amended", although in fact, no amendment had been indicated within the claim. Thus, the status of claim 30 has been corrected to reflect that no amendment has been made to claim 30.

Authorization is given by Corning Incorporated to charge the appropriate fee and any additional fees necessary due in connection with this filing to Deposit Account No. 03-3325.

Respectfully submitted,

Date: 7/21/04

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Boek et al.	
Serial No:	10/035,535	Examiner: J. Hoffmann
Filing Date:	10/26/2001	Group Art Unit: 1731
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BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated December 2, 2003, in the application listed above. Appellant filed the Notice of Appeal on February 27, 2004. A Brief filed on April 26, 2004 was determined to be defective and Appellant was given 30 days to file a new Brief. Appellant now submits this Brief in triplicate, as required by 37 C.F.R. § 1.192(a).

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

II. RELATED APPEALS AND INTERFERENCES

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

On February 27, 2004 appellant appealed from the final rejections of claims 1-35

which were rejected in the final Office Action dated December 2, 2003. Those are the pending claims that are the subject of this Appeal and are set forth in the attached Appendix.

IV. STATUS OF AMENDMENTS

Appellants filed an amendment after final rejection on February 9, 2004 to claims 16 and 29. In an advisory action mailed February 17, 2004, the Examiner indicated that the amendments to claims 16 and 29 had not been entered. Appellants withdraw the amendment herewith.

V. SUMMARY OF INVENTION

The present invention relates to a method of manufacturing an optical waveguide preform. In particular, an optical waveguide preform is exposed to an atmosphere comprising a chlorine-containing compound, wherein the optical waveguide preform is doped with chlorine (page 5, lines 25-31). The atmosphere is at an absolute pressure substantially greater than about 1.013×10^2 kPa, i.e. substantially greater than one atmosphere (page 7, lines 1-3). In another aspect, the present invention is an apparatus for manufacturing an optical waveguide preform which includes a furnace defining a chamber adapted to contain the preform and also includes a heating device operable to heat the chamber (page 4, lines 2 - page 5, line 4). The pressure chamber is adapted to contain a large internal pressure (page 5, lines 5-8). A fluid control system is operable to provide an atmosphere including a chlorine-containing compound in the chamber at an absolute pressure substantially greater than about 1.013x102 kPa (page 5, line 22 – page 6, line 16). The present invention advantageously provides an optical fiber preform with an enhanced level of chlorine doping (page 3, lines 16-19). Such enhanced level of chlorine doping may provide improved viscosity matching between the chorine-containing layer of the preform and another layer, thereby reducing or minimizing the tensile or compressive stresses resulting from differential viscosities during

the draw process (page 3, lines 20-24).

VI. ISSUES

Issues presented for consideration in this Appeal are:

A. 35 USC §112, first paragraph

Whether claims 16-18 and 29-31 comply with the written description requirement under 35 USC § 112, first paragraph.

B. 35 U.S.C. § 102

Whether claims 32-35 are patentable under 35 U.S.C. § 102(b) as being novel over US Patent 5,145,507 (Kyoto et. al).

C. 35 U.S.C. § 103

Whether claims 1-31 are patentable under 35 U.S.C. § 103(a) as being nonobvious over US Patent 6,116,055 (Ishikawa et al.) and further in view of Kingery's "introduction to Ceramics, pages 219-226.

VII. GROUPING OF CLAIMS

In compliance with 37 C.F.R. § 1.192(c)(5), Appellants state that all of the claims stand or fall together.

VIII. ARGUMENTS

A. Whether claims 16-18 and 29-31 comply with the written description requirement under 35 USC § 112, first paragraph.

Claims 16-18 and 29-31 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

In his final Office Action the Examiner rejected claims 16 and 29 under U.S.C. §112, first paragraph, on the grounds that there is "...no support for the new limitation of improving a mismatch" and further under 35 U.S.C. §103(a), observing that "...one could arbitrarily

designate any preform to be 'like' any other preform in that they are both preforms, or that they are both cylindrical. One can also designate what one constitutes an improvement as being either a reduction or an improvement – the claim does not specify which way the mismatch is improved."

Section 112, first paragraph requires that the written description "need not describe the claimed subject matter in exactly the same terms as used in the claims; it must simply indicate to persons skilled in the art that as of the [filing] date, the applicant had invented what is now claimed", All Dental Prox LLC v. Advantage Dental Products Inc., 64 USPQ2d 1945 (CAFC 2002) quoting Eiselstein v. Frank, 52 F.3d 1035, 1038, 34 USPQ2d 1467, 1470 (CAFC 1995). "The failure of the specification to specifically mention a limitation that later appears in the claims is not a fatal one when one skilled in the art would recognize upon reading the specification that the new language reflects what the specification shows has been invented, *Id.*

Appellants argue that the meaning of the claims as currently written would be clear to one skilled in the art, and that, as conveyed through the specification, possession of the claimed invention by the inventors is demonstrated. See for example, page 3, lines 20-25 of the specification wherein it is clear that what is sought is an improvement in matching the viscosity of two regions of glass. See also page 3, lines 30-33, wherein the specification states that enhanced doping of the soot preform may also be advantageous for, *inter alia*, reducing mechanical stress from viscosity mismatch. Thus, it is clear that the invention comprises an improvement in viscosity matching by reducing the viscosity mismatch. One skilled in the art would interpret "improves mismatch" to mean reducing the mismatch or providing for closer matching. It is not necessary that the specification provide *in haec verba* support for the language added to the claims.

With regard to the phrase "compared to a like preform", this also would be clear to one skilled in the art. One skilled in the art would interpret this to mean that a preform which has been doped with chlorine in accordance with the invention exhibits improved viscosity matching over a preform which, but for the chlorine doping, is identical. See, for example, page 8, lines 19-22; "The chlorine doping of the layer 5B may serve to provide closer matching of the inner layer 5B and the layer 6 at the drawing temperatures than is provided if the inner layer 5B were not chlorine doped in accordance with the present invention."

Appellants request that the Board reverse the rejection under §112, first paragraph,

and allow claims 16-18 and claims 29-31.

B. Whether claims 32-35 are patentable under 35 U.S.C. § 102(b) as being novel over US Patent 5,145,507 (Kyoto et. al).

Claims 32-35 stand finally rejected under 35 U.S.C. §102(b) as being anticipated by Kyoto et al. (U.S. Patent No. 5,145,507).

The Examiner points to Figure 3 and that text which describes Figure 3 as anticipating Appellants' invention, and suggests that the differences between Kyoto and Appellants' invention, i.e. gases and pressures, are method of use limitations only. Appellants respectfully disagree.

Functional language in an apparatus claim requires that the apparatus possess the capability of performing the recited function. Intel Corp. v. U.S. International Trade Commission, 948 F2.d 821, 832, 20 USPQ2d 1161, 1171 (Fed. Cir. 1991). Appellants argue that the limitations a) "a pressure chamber capable of attaining an absolute pressure, substantially greater than 1.03×10^2 kPa" and b) "a fluid control system operable to provide an atmosphere including a chlorine containing gas in said chamber at an absolute pressure of substantially greater than 1.03×10^2 kPa", i.e. substantially greater than 760 Torr, constitute proper limitations upon the apparatus. As required, the claims are clear, and a person of ordinary skill in the art would understand their meaning.

In his Advisory Action, the Examiner argues, with respect to Kyoto, that "one cannot have a high pressure treatment without a device which can create a high pressure."

Neither Figure 3 nor the text in Kyoto et al. provide any evidence that the pressure chamber depicted and described is capable of attaining a pressure substantially greater than one atmosphere. Indeed, Kyoto consistently recites a pressure of several tens of Torr down to 10^{-3} Torr, "the lower the pressure the better" (column 5, lines 34-35, 46-49, Column 2, lines 64-66). The highest pressure recited by Kyoto with regard to the disclosed apparatus is one atmosphere (column 1, lines 52-55), i.e. 760 Torr. Kyoto hypothesizes the use of a pressure of 5 atmospheres, and based on calculation only, dismisses such use as providing results "much worse than the above case" (column 5, line 65 through column 6, lines 1-2). However, such hypothetical case is not ascribed to the apparatus disclosed in FIG. 3 and the text.

Appellants assert that Kyoto does not teach a high pressure treatment, and certainly does not teach a high pressure chlorine treatment at pressures substantially above one atmosphere.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of anticipation, and respectfully request that the Board reverse the §102 rejection and find claims 32-35 allowable.

C. Whether claims 1-31 are patentable under 35 U.S.C. § 103(a) as being nonobvious over US Patent 6,116,055 (Ishikawa et al.) and further in view of Kingery's "introduction to Ceramics, pages 219-226.

Claims 1-31 stand finally rejected under 35 U.S.C §103(a) as being unpatentable over U.S. Patent 6,116,055 (Ishikawa et al.) and further in view of Kingery's "Introduction to Ceramics", pages 219-226.

Obvious-to-try

"An 'obvious-to-try' situation exists when a general disclosure may pique the scientist's curiosity, such that further investigation might be done as a result of the disclosure, the disclosure itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued.", In re Eli Lilly & Co., 14 USPQ2d 1741, 1743 (CAFC 1990).

With regard to a pressure greater than one atmosphere, Ishikawa states only "If the partial pressure of $SiCl_4$...is more than 1 atm, a pressurized furnace must be used, entailing a problem of complex furnace structure" (column 1, lines 61-65). It does not establish that the use of a total pressure substantially greater than one atmosphere would or would not be effective to dope a preform, or that it is otherwise desirable.

The Examiner contends that it would have been obvious to use as "...high a pressure as reasonably possible, so as to maximize the amount of chlorine in the preform", and in his Advisory Action, the Examiner further argues with regard to Ishakawa's statement pertaining to the problem of a complex furnace design "...IT CAN BE DONE if one is willing to go through the extra effort and complexity" (emphasis in original).

Appellants respectfully disagree, and assert that Ishikawa teaches nothing beyond the fact that use of a partial pressure greater than one atmosphere presents a problem. While Kingery may broadly suggest that increasing pressure can increase diffusion of a gas across a

boundary or into a body, Kingery does not disclose or suggest doping an optical fiber preform with chlorine at a pressure substantially greater than one atmosphere, where one skilled in the art would understand doping to mean not mere diffusion, but permanent retention of the chlorine within the preform body once the doping process has been completed (as the chlorine is intended to remain through the glass phase of the preform in order to effect a viscosity change when drawing the glass preform into an optical fiber). Appellants contend that Ishikawa and Kingery, combined, at best merely suggest that it might be obvious to try chlorine doping at high pressure.

As the Federal Circuit has noted, "A general incentive does not make a particular result, nor does the existence of techniques by which those efforts can be carried out", In re Duel, 34 USPQ2d 1210, 1216 (CAFC 1995). Ishikawa makes no claim that doping at high pressure (e.g. substantially greater than one atmosphere) would be effective. Certainly the most obvious observation is that Ishikawa would undoubtedly have been aware of Fick's law and the other equations and laws cited by the Examiner, and yet armed with the knowledge of his own invention, the path Ishikawa chose was not one which included a total pressure substantially greater than one atmosphere, suggesting that knowledge of Fick's and other laws was not sufficient motivation for Ishikawa to explore high pressure doping.

Even assuming, *arguendo*, that Ishikawa's reference to partial pressure greater than one atmosphere suggests a direction to explore, Ishikawa does not teach how one would do this, and neither does Kingery.

Reference must be enabling

"In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method", Beckman Instruments Inc. v. LKB Produkter AB, 13 USPQ2d 1301, 1304 (CAFC 1989).

Ishikawa suggests a pressure in excess of one atmosphere presents a problem. However, Ishikawa provides no prescription for how one would go about overcoming that problem. That Ishikawa chose not to pursue high pressure doping due to an inherent problem, and discloses no other teaching other than to point out that problem, provides a *per se* argument that Ishikawa's disclosure is non-enabling, particularly as it relates to chlorine doping at a pressure substantially greater than one atmosphere. Again, Kingery does not cure this deficiency.

The Examiner in his Advisory Action contends that high pressure chlorine doping is

within the capabilities of one skilled in the art by inferring that Ishikawa's statement pertaining to a complex furnace design does not state that it is impossible. The Examiner cites In re Sola, 22 CPA (Patents) 1313, 77 f2nd 627, 25 USPQ 433, "it may be patentable if the modification was within the capabilities of one skilled in the art", as support, but cites no reference which establishes high pressure chlorine doping as within the state of the art, or within the capability of one having ordinary skill, at the time the invention was made.

Appellants argue that "impossibility" is not a proper criterion for determining nonobviousness. Appellants are also unsure of the relevance of In re Sola, as Sola pertains to estoppel arising from an interference, and the value of commercial success as evidence of patentability. The passage cited by the Examiner is not found in Sola.

Examiner is Using Improper Hindsight Reasoning

The Examiner asserts that it would be obvious to use as high a pressure as possible given the teachings of Ishikawa et al., Kingery and the ideal gas law. However, a showing of a suggestion to combine must be clear and particular, and hindsight must be rigorously avoided. Ecolochem Inc. v. Southern California Edison, 56 USPQ2d 1065 (CAFC 2000).

The Examiner begins with Appellants' disclosure as a blueprint, and then seeks references which, when combined, may yield Appellants' invention. As discussed *supra*, Ishikawa specifically discourages extending the partial pressure (let alone the total system pressure) above one atmosphere. Kingery, on the other hand, merely shows that an increase in pressure may effect an increase in the diffusion of a gas through a boundary or into a body. Neither reference suggests that exposing a soot preform to a chlorine-containing gas at a pressure substantially greater than one atmosphere will be effective in doping a preform with an enhanced level of chlorine. With regard to the general laws of nature cited by the Examiner, "..all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious...", Diamond, Commissioner of Patents and Trademarks v. Diehr and Lutton (450 U.S. 175, 209 USPQ 1 (SC 1981), footnote 12.) The Examiner argues that it would have been obvious to apply those laws in this instance, and therefore raise the pressure to as high as reasonably possible, but provides no specific evidence pointing to the efficacy of this modification as it relates to chlorine doping, or how high reasonable is, and therefore fails to suggest a motivation for making the modification or to derive Appellants' claim limitation from the references. At best, this amounts to an obvious-to-try argument, as considered above.

The Examiner argues that pressure represents a result effective variable. "Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art", In re Boesch and Slaney, 205 USPQ 215, 219 (CCPA 1980). Appellants argue that the claimed invention, high pressure chlorine doping, as evidenced by the arguments *supra*, was not a known process at the time of the invention, and therefore limitations as to pressure, as well as temperature, mole percentage chlorine, weight percentage chlorine in the preform (e.g. as recited in claims 1 and 19) are not result effective variables.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of obviousness, and that the Board should reverse the §103 rejection and find that claims 1 -31 are allowable over the prior art of record.

IX. CONCLUSION

In conclusion, Appellants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the pending claims 1-35.

If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

Dated: 7/21/04

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7/21/04

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APPENDIX TO BRIEF ON APPEAL

The claims on appeal are as follows:

1. **(previously amended)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas and thereby doping the soot preform with chlorine, wherein the absolute pressure of the atmosphere is substantially greater than 1.013×10^2 kPa.

2. **(original)** The method of Claim 1 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

3. **(original)** The method of Claim 1 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

4. **(original)** The method of Claim 1 wherein the mole percentage of chlorine present in the atmosphere is greater than about 20%.

5. **(original)** The method of Claim 1 wherein the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

6. **(original)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is greater than about 1%.

7. **(original)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

8. **(previously amended)** The method of Claim 1 wherein the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, Cl_2, CCl_4, $SOCl_2$, $POCl_3$ and combinations thereof.

9. **(original)** The method of Claim 1 wherein the atmosphere is at a temperature of at least about 1000 °C.

10. **(original)** The method of Claim 1 wherein the atmosphere is at a temperature of between about 1250 and 1350 °C.

11. **(original)** The method of Claim 1 wherein the absolute pressure of the atmosphere is greater than about 2.026×10^2 kPa.

12. **(original)** The method of Claim 1 wherein the absolute pressure of the atmosphere is between about 4.052×10^2 and 16.32×10^2 kPa.

13. **(original)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of at least 60 minutes.

14. **(original)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

15. **(previously amended)** The method of Claim 1 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

16. **(previously amended)** The method of Claim 1 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping of the soot preform improves mismatch of the viscosities of the inner layer and the outer layer at said drawing temperatures as compared to a like perform with a non-chlorine doped inner layer.

17. **(previously amended)** The method of Claim 16 wherein the inner layer includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum and titanium.

18. **(previously amended)** The method of Claim 17 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

19. **(previously amended)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas for a period of at least 60 minutes and thereby doping the soot preform with chlorine, wherein:

the absolute pressure of the atmosphere is substantially greater than 1.013×10^2 kPa;

the mole percentage of chlorine present in the atmosphere is greater than about 20%;

the weight percentage of chlorine present in the soot preform is greater than about 1%;

the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, Cl_2, CCl_4, $SOCl_2$, $POCl_3$ and combinations thereof; and

the atmosphere is at a temperature of at least about 1000 °C.

20. **(original)** The method of Claim 19 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

21. **(original)** The method of Claim 19 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

22. **(original)** The method of Claim 19 wherein the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

23. **(original)** The method of Claim 19 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

24. **(original)** The method of Claim 19 wherein the atmosphere is at a temperature of between about 1250°C and 1350 °C.

25. **(original)** The method of Claim 19 wherein the absolute pressure of the atmosphere is greater than about 2.6×10^2 kPa.

26. **(original)** The method of Claim 19 wherein the absolute pressure of the atmosphere is between about 4.052×10^2 and 16.32×10^2 kPa.

27. **(original)** The method of Claim 19 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

28. **(previously amended)** The method of Claim 19 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

29. **(previously amended)** The method of Claim 19 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping improves mismatch of the viscosities of the inner layer and the outer layer at said drawing temperatures as compared to a like perform with a non-chlorine doped inner layer.

30. **(original)** The method of Claim 29 wherein the inner layer includes silica and a material selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

31. **(previously amended)** The method of Claim 30 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

32. **(previously amended)** An apparatus for manufacturing an optical waveguide preform using a soot preform, said apparatus comprising:

a) a furnace defining a pressure chamber adapted to contain the soot preform and including a heating device operable to heat said chamber, the pressure chamber capable of attaining an absolute pressure substantially greater than 1.013×10^2 kPa; and

b) a fluid control system operable to provide an atmosphere including a chlorine-containing gas in said chamber at an absolute pressure of substantially greater than 1.013×10^2 kPa.

33. **(original)** The apparatus of Claim 32 wherein said fluid control system includes:

a flow control device selectively operable to prevent and allow flow of said atmosphere into and out of said chamber;

a pressurizing device operable to pressurize said atmosphere in said chamber to a selected pressure; and

a controller operative to control said flow control device and said pressurizing device.

34. **(original)** The apparatus of Claim 33 wherein said flow control device includes at least one valve.

35. **(original)** The apparatus of Claim 33 wherein said pressurizing device includes a compressor.